# DISTRIBUTED DIFFERENTIAL COUPLING COMBINED POWER SYSTEM

### BACKGROUND OF THE INVENTION

In recent years, energy and noise pollution problems have become more and more serious. A good solution to these problems would be to use electrical power driven vehicles, but development of electrical power driven vehicles has up to now been limited by the capacity of the batteries to achieve a larger moving range. Increasing the battery volume or quantity to increase the range will correspondingly increase the self-weight of the carrier, resulting in higher electrical energy consumption and does not meet economic requirements. Therefore, in the absence of a major breakthrough in solving the battery technical problems, a more practical driving method is to use combined driving structure designs. Current combined driving structure designs include:

- (A) Series Combined Power Design: This design is the most typical structure for an electrically driven vehicle. In this design a generator is driven by the engine to generate electricity and charge the battery, after which the battery provides electricity to the driven motor to drive the vehicle. As the energy is converted several times, the overall efficiency of this design is low. An example of this design is the GM HX3 vehicle of General Motors.
- (B) Synchronized Power on Common Shaft Design: This design involves directly series combining the engine power output shaft and the rotating shaft of the driven motor, to thereby generate driving and speed controlling functions. An example of this design is West Germany's Volkswagen CHICO sedan.

For the case of the conventional engine and motor described in (B), only one of the engine and motor can be selected for output transmission, and the combination of their power output is not available.

In contrast, the disclosed distributed differential coupling combined power system of the invention permits the output power from the output shaft of an engine (or other rotational power source) to not only drive a front section load, but also to be combined with an electromagnetic coupling device to drive a rear section load. The electromagnetic coupling device is constituted by an AC or DC, brushed or brushless electric machine, and is a two-end structure. It includes a rotational field generating structure and a rotor, and the rotor shaft (or the field rotating shaft) is used as the output shaft to form an electromagnetic coupling device, while the other end is coupled with the engine output shaft through the transmission gear system. This design is capable of adding the power and speed of the engine output to the output generated by the electromagnetic coupling device itself to drive the rear load without being affected by the speed relationship between the two. In general, it has a smaller system volume and saves the cost and space in comparison with other combined power systems.

#### SUMMARY OF THE INVENTION

The distributed differential coupling combined power distribution system of the invention may be used in driving vehicles, ships, flying machines or other mechanical, industrial, or processing equipment which require a rotational power source. The power system involves the rotational output shaft of a internal combustion engine (or other rotational power sources), and is not only used to drive a

front section load directly or through transmission devices such as transmission gears, belts, chains, or the couplers, but is also coupled with the input shaft of an electromagnetic coupling device to drive the rear section load. The electromagnetic coupling is a two-end structure, and is respectively combined with a stator and rotor structure to be controlled by an operating device for generating motor driving functions when an input current is applied to the electromagnetic coupling device or for operating variable speed coupling functions through the output current when employed as a generator, or for use in starting the engine and as a power regeneration brake, particularly when the engine is the main transmission power source, to charge the battery through the difference between the speed of the rotational field generated by the stator and the speed of the rotor, the speed difference with the rear load section being thereby adjusted by controlling the charging current. The engine can be at a constant speed or at a speed which is partially adjustable to maintain a working speed having a higher operating efficiency and lower pollution, with a portion of the differential speed output power generated through the electromagnetic coupling device being used for driving the load while the remaining part of the power is converted through the generator function of the electromagnetic coupling device to charge the battery. The electromagnetic coupling thereby promotes engine efficiency during variable speed driving at low driving speeds while acquiring charging power for the battery and reducing pollution, and in addition to providing a variable speed coupling, the electromagnetic coupling can also be used as a driving motor to generate a rotational output for driving the load independently of or together with the engine.

#### BRIEF DESCRIPTION OF THE DRAWINGS

- FIG. 1 is a schematic diagram of the system of a first, preferred embodiment.
- FIG. 2 is a schematic diagram of a first variation of the system of FIG. 1.
- FIG. 3 is a schematic diagram of a second variation of the system of FIG. 1.
- FIG. 4 is a schematic diagram of a third variation of the system of FIG.  $\boldsymbol{1}$ .
- FIG. 5 is a schematic diagram of a fourth variation of the system of FIG. 1.
- FIG. 6 is a schematic diagram of a fifth variation of the system of FIG. 1.
- FIG. 7 is a schematic diagram of a sixth variation of the system of FIG. 1.
- FIG. 8 is a schematic diagram of a seventh variation of the system of FIG. 1.

## DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

FIG. 1 shows a preferred embodiment of a distributed differential coupling combined power system, including the following principal elements:

A drive side rotational power source, having an output which is first supplied to control the front section load and then transmitted to the input end of a two-end shaft type electromagnetic coupling device to drive a rear section load;

An electromagnetic coupling device connected by a direct transmission to another load, through a transmission component to another load, or through a differential gear system to a differentially acting load such as the side rear wheels of a vehicle.

More specifically, the embodiment illustrated in FIG. 1 includes the following elements:

A drive side rotational power unit P101 in the form of an internal combustion engine or other power source, wherein the rotational output shaft S102 coupled to a middle transmission device and a control interface M102 through a clutch CL102. Engine P101 further includes a speed sensor SD101 for transmitting an engine rotation signal to a central controller CCU101, with the controllable fuel valve CGIOI being controlled by the central controller CCU101 to change the engine speed or to keep the engine maintained at a constant speed;

A middle transmission device and a control interface M102 made up of an automatic or manual speed change control system similar to one in a conventional front wheel drive system but which can be used to drive the front section load only or to drive front and rear loads. A clutch CL103 is installed between the middle input shaft S101 and the front section load to provide the transmission coupling or to cut off the transmission relationship between the middle transmission device and the front wheels, although the clutch CL103 can also be replaced by a neutral shift or co-installed with the neutral shift when the shift interface is in a neutral shift status. The middle shaft S101 is coupled at the output end of the clutch CL102 and is either directly rearwardly extended or connected through a transmission device to cause the rotational speed difference between the middle shaft S101 and the output presented to have a constant speed ratio or a non-constant speed ratio, in a manner similar to the rear extended rear wheel transmission shaft in a four wheel drive vehicle. A brake B101 controlled by the central controller CCU101 is further installed between the middle shaft S101 and the fixed casing;

A direct driven front section load W101 made up of one or more than one driven wheels with driven resistance of a load:

An electromagnetic coupling device M101 in the form of a two-end shaft structure which is made up of a rotational field generating structure and a rotor, and in which the rotational field and the rotor are respectively coupled with the transmission middle shaft S101 and the input shaft of a rear differential gear box GB101 through a clutch CL104, to thereby drive the differential rear section load W102 at both sides. The coupling device may be an AC or DC, brushed or brushless electrical machine, and in particular a series excited or auxiliary compound excited electrical machine having the electrical characteristic that its rotational speed increases with a decreasing load, or an AC or DC brush or brushless machine able to perform current control (including constant current control) through the operating control of a drive circuit device D101 to help provide additional torque on the driven load;

An optional clutch CL101 controlled by the central controller CCU101 and installed between the rotational field generating structure and the rotor as required to directly provide a synchronized mechanical interlock between the field and rotor.

A drive circuit device D101 which is installed between the electromagnetic coupling device M101 and the battery BT101 for receiving operating commands from the central controller CCU101 to control the electromagnetic coupling device functioned so as to function as a generator to charge the battery or supply power to the other load or to provide a current controllable generator output to control the cou-

pling torque, thereby changing the rotation speed in dependence on load conditions;

A central controller CCU101 which follows commands from the operator and monitors the operating status of the drive side rotational power unit P101 to generate corresponding control commands for the drive circuit device D101;

An optional brake B102 can be installed as needed between the casing of the electromagnetic coupling device M101 and the side of a clutch CL104 which is located between the electromagnetic coupling device double acting structure and the coupled rear differential gear box, to thereby drive the front section load, start the engine, or provide power generation at stand-still, at which time the electromagnetic coupling device is driven by the engine to function as a generator to charge the battery or supply power to the other loads. For the case of AC power generation output functions, the electromagnetic coupling device M101 is employed as an electrical machine with AC power generating functions and made up of a permanent magnet or winding excited, variable frequency field type of electrical device, or a brushed alternator type of electrical device, armature winding being commonly installed with the conducting rings for AC output and with the commutators for DC input/output, as a result of which the AC output can be a variable frequency output or a constant frequency output depending on the engine constant speed control;

Finally, the aforesaid direct driven load and the distributed differential load may be made up of one or more than one rotational power sources, or one or more than one direct driven load, or one or more than one double acting electromagnetic coupling device and its driven load groups in sequential series combinations, to form an extended compound series combined structure.

The functions of the preferred embodiment shown in FIG. 1 are illustrated in Table 1 as follows:

F1-A F1-B F1-C F1-D are the various system operations when the engine drives the load at low speed output;

F2 and F3 are system operations when the electromagnetic coupling device is powered by a battery to drive the load as a motor:

F4-A and F4-B are system operations when the electromagnetic coupling device is powered by the battery to be operated as a motor drives the load with the engine together so as to have a large power output due to the addition of output power;

F5, F6 and F7 are system operations when the electromagnetic coupling device is operated as a generator driven by the feedback mechanical energy of the load to charge the battery or to function as a brake by utilizing the friction damping of the engine itself;

F8 is the system operation when the electromagnetic coupling device is driven by the engine to be operated as a generator to charge the battery. This function can further include a charging timing control to stop automatically at a preset time and AC generating functions as decided above.

F9 is a function in which the electromagnetic coupling device is operated as a motor and is powered by the battery to start the engine;

F10 is a function in which all of the system clutches and brakes are in an "OFF" state to provide low loss sliding operation.

The above system operating functions listed in Table 1 are described in more detail as follows:

F1-A. To achieve this function, the engine fuel valve is controlled to drive the engine from low speed to high speed, as follows: The internal combustion engine services as the drive side rotational power source and is controlled by the engine fuel valve to drive the rear section load, at which time clutches CL101, CL102, and CL104 are in an ON state while the CL103 is in an OFF state and the brakes B101 and B102 are in an OFF state:

The internal combustion engine serves as the drive side rotational power source and is controlled by the engine fuel valve to drive the front and rear section loads, at which time clutches CL101.. CL102. CL103 and CL104 are all in an ON state and the brakes B101 and B102 are in an OFF state;

The internal combustion engine serves as the drive side rotational power source and is controlled by the engine fuel valve to drive the front section load, at which time clutches CL102 and CL103 are in an ON state while the clutches CL101 and CL104 are in an OFF state, and the brakes B101 and B102 are in an OFF state, and the electromagnetic coupling is in a no-load state;

F1-B: To achieve this function, the engine fuel valve and the electromagnetic coupling device M101 is controlled simultaneously to drive the engine from low speed to high speed and to charge the battery simultaneously, as follows:

The internal engine serves as the drive side rotational power source and is controlled by the engine fuel valve to change the engine and operate the electromagnetic coupling device as a generator for charging the battery and driving the rear section load, at which time the clutches CL101 and CL103 are in an OFF state while the clutches CL102 and CL104 are in an ON state and the brakes B101 and B102 are in an OFF state:

The internal combustion engine serves as the drive side rotational power source and is controlled by the engine fuel valve to change the engine speed change and operate the electromagnetic coupling device as a generator to charge the battery and to drive the front and rear section loads together with the engine, at which time the clutches CL102. CL103 and CL104 are in an ON state while the CL101 is in an OFF state and the brakes B101 and B102 are in an OFF state;

The internal combustion engine serves as the drive side rotational power source and is controlled by the engine fuel valve to change the engine speed and drive the front section load as well as to operate the electromagnetic coupling device as a generator to simultaneously charge the battery, at which time the clutches CL101 and CL104 are in an OFF state while the CL102 and CL103 are in an ON state: the brakes B101 is OFF and the B102 is in an ON state.

F1-C: To achieve this function, the engine is speed controlled or operated at a constant speed, and the battery charging current from the M101 is controlled to change the output power to the load as follows:

The internal combustion engine serves as the drive side rotational power source, and the engine is controlled by the engine fuel valve and the speed feedback signal to operate at a constant speed as well as to operate the electromagnetic coupling device as a generator to charge the battery and adjust the coupling torque to drive the rear section load, at which time the clutches CL101 and CL103 are in an OFF state while the clutches CL102 and CL104 are in an ON state and the brakes B101 and B102 are in an OFF state:

The internal combustion engine serves as the drive side rotational power source, and the engine speed is con-

trolled by the engine fuel valve and the speed feedback signal to drive the front section load as well as to operate the electromagnetic coupling device as a generator to charge the battery, and to adjust the coupling torque to drive the rear section load, at which time the clutches CL101 is in an OFF state while the clutches CL102, CL103 and CL104 are in an ON state and the brakes B101 and B102 are in an OFF state:

F1-D: To achieve this function, electromagnetic coupling device M101 generates a short current to control the output shaft torque and thereby change the engine speed. as follows:

The internal combustion engine serves as the drive side rotational power source, and the engine fuel valve and the speed feedback signal are utilized to operate the engine at a variable speed or a constant speed and simultaneously to operate the electromagnetic coupling device M101 as a generator and control, based on the generated short circuit, current, the coupled torque, thereby to changing the power distribution between the front and rear section loads, at which time the clutches CL101 and CL103 are in an OFF state while the clutches CL102 and CL104 are in an ON state and the brakes B101 and B102 are in an OFF state;

The internal engine serves as the drive side rotational power source, and the engine fuel valve and speed feedback signal are utilized to control the engine speed and simultaneously to operate the electromagnetic coupling device M101 as a generator and control on a generated short cut circuit current to change the coupled torque, thereby changing the power distribution between the front and rear section loads, at which time the clutch CL101 is in an OFF state while the clutches CL102. CL103 and CL104 are in an ON state and the brakes B101 and B102 are in an OFF state;

F2: To achieve this function, electromagnetic coupling device M101 is powered by the battery to change the speed or the rotation direction of the rear section load, as follows:

The electromagnetic coupling device M101 is powered by the battery to drive the rear section load by operating the electromagnetic coupling device M101 as a motor while the brake B101 is in an ON state and the brake B102 is in an OFF state, the clutches CL101, CL102 and the clutch CL103 for controlling the front section load are in an OFF state, and the CL104 is in an ON state.

F3: To achieve this function, electromagnetic coupling device M101 is powered by the battery to change the speed or the rotation direction of the front section load, as follows:

The electromagnetic coupling device M101 is powered by the battery to drive the front section load, at which time the electromagnetic coupling device is operated as a motor while the brake B102 is in an ON state, the brake B101 is in an OFF state, the clutches CL101, CL102 and CL104 are in an OFF state, and the clutch CL103 is in an ON state.

F4-A: To achieve this function, the engine is operated at a preset speed while the electromagnetic coupling device M101 is operated as a motor to provide added power output to drive the rear section load as follows:

The internal combustion engine serves as the drive side rotational power source, and is operated at a variable or constant speed while the electromagnetic coupling device M101 is powered by the battery to provide an

added power output for driving the rear section load simultaneously. At this time, the clutches CL101 and CL103 are in an OFF state while the CL102 and CL104 are in an ON state and the brakes B101 and B102 are in an OFF state;

F4-B: To achieve this function, the engine is operated at a preset speed while the electromagnetic coupling device M101 is operated as a motor to provide added power output to drive the front and rear section loads as follows:

The internal engine serves as the drive side rotational power source, and the engine is operated at a variable or constant speed while the electromagnetic coupling device M101 is powered by the battery to provide added power output to drive the front and rear section loads simultaneously. At this time, the clutch CL101 is in an OFF state while the clutches CL102 CL103 and CL104 are in an ON state and the brakes B101 and B102 are in an OFF state;

F5: To achieve this function the electromagnetic coupling device M101 is operated as a generator to charge the battery using the recovered rear section kinetic energy as follows:

The engine speed is reduced or the fuel valve is closed and the electromagnetic coupling device M101 is operated as a generator to convert the rotational mechanical energy of the rear section load into electric power to charge the battery, or to consume the electric power by other loads, thereby obtaining friction damping and, together with the engine piston friction damping, provide a braking friction damping, during the brakes B101 and B102 are in an OFF state, the clutches CL101 and CL103 are in an OFF state, the clutches CL102 and CL104 in an ON state, and the engine can be stopped or slowly operated;

The electromagnetic coupling device M101 is operated as a generator to convert the rotational mechanical energy of the rear section load into electric power to charge the battery, or to consume the electric power by other loads, thereby obtaining friction damping, during which the brake B101 is in an ON state while the brake B102 is in an OFF state, the clutches CL101, CL102 and CL103 are at OFF state, and the engine can be stopped or operated at a slower speed than the sliding speed, and when the CL104 is at ON state, the engine can be operating or stopped.

F6: To achieve this function the electromagnetic coupling device M101 is operated as a generator to charge the battery using the recovered front section kinetic energy, as follows:

The engine speed is reduced or the fuel valve is closed and the electromagnetic coupling device M101 is operated as a generator to convert the rotational mechanical energy of the front section load into electric power to charge the battery, or to consume the electric power by other loads, thereby obtaining friction damping and together with the engine piston friction damping provide a braking friction damping, during which the brake B101 is in an OFF state, the brake B102 is in an ON state, the clutches CL101 and CL104 are in an OFF state, the clutches CL102 and CL103 are in an ON state, and the engine can be stopped or slowly operated:

The electromagnetic coupling device M101 is operated as a generator to convert the rotational mechanical energy of the front section load into electric power to charge the battery, or to consume the electric power by other loads, thereby obtaining friction damping, during

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which the brake B102 is in an ON state, the brake B101 is in an OFF state, the clutches CL101, CL102 and CL104 are in an OFF state, the clutch CL103 is in an ON state, and the engine can be stopped or operated at a slower speed than the sliding speed, and when the CL102 is in an OFF state, the engine can be in an operating state or stopped.

F7: To achieve this function, all of the loads are braked by engine friction damping, as follows:

The engine speed is reduced or the fuel valve is closed and the generator is operated to convert the rotational mechanical energy of the front and rear section loads into friction damping and together with the engine piston friction damping provide a braking friction damping, during which brakes B101 and B102 are in an OFF state, the clutch CL101 is in an OFF state, the clutches CL102, CL103 and CL104 are in an ON state, and the engine can be stopped or slowly operated;

F8: To achieve this function, the system is self charged, as follows:

The electromagnetic coupling device M101 is driven by the drive side rotational power source to be operated as a generator to charge the battery or supply power to other loads. At this time, when the engine is started, the brake B101 is in an OFF state, brake B102 is in an ON state, the clutches CL101, CL103, and CL104 are in an OFF state, the clutch CL102 is in an ON state; and the time can be further utilized to preset the engine charging time or control the charging capacity for automatic stop. AC Power generating functions can be included as described above in connection with the description of generator structure.

F9: To achieve this function, the electromagnetic coupling device M101 is operated as a motor to start the engine, as follows:

The electromagnetic coupling device M101 is used to start the drive side engine, at which time brake B102 is in an ON state, brake B101 is in an OFF state, the front section operating interface M102 and the front section coupled clutches CL101, CL103 and CL104 are in an OFF state and clutch CL102 is in an ON state:

F10: Neutral slide: This is the slide function of the system when no power is output and a brake is activated, at which time the engine can be in an operating state or stopped, brakes B101 and B102 are in an OFF state, and the clutches CL101, CL102, CL103 are in an OFF state.

F11: To achieve this function, the engine is used to drive the front section load, and the electromagnetic coupling device M101 is powered by the battery to drive the rear section load, and both are independently operated to drive the respective loads, at which time brake B101 is in an ON state, brake B102 is in an OFF state, clutches CL101, CL105 are in an OFF state, and clutches CL102, CL103 and CL104 are in an ON state:

F12: To achieve this function, the engine is used to drive the front section load and the electromagnetic coupling device M101 is operated as a generator to charge the battery, at which time brake B101 is in an ON state, B102 is in an OFF state, clutches CL101, CL105 are in an OFF state, and clutches CL102, CL103 are in ON state.

The preferred embodiment of the distributed differential coupling combined power system shown in FIG. 1 may have the following variations in practical applications:

FIG. 2 shows the first application of the system of FIG. 1. In this application clutch CL104 and brake B102 are both eliminated, and the system functions are delineated in Table 2.

FIG. 4 shows the third application of the system of FIG. 1: It discloses an application in which B102, and clutches CL101 and CL104 are eliminated, and the system functions are delineated in Table 4.

FIG. 5 shows the fourth application of the system of FIG. 1: it discloses an application in which an additional clutch CL105 is installed between the rear section output middle shaft and the middle transmission device while clutch CL103 is reserved for controlling the front section load or replaced by a speed change shift of the middle transmission devices, and the system functions are delineated in Table 5.

FIG. 6 shows the fifth application of the system of FIG. 1. In this application, a clutch CL105 is installed between the rear section output middle shaft and the middle transmission device, clutch CL104 is eliminated, and the system functions are delineated in Table 6.

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FIG. 7 shows the sixth application of the system of FIG. 1. In this application a clutch CL105 is installed between the rear section output middle shaft and the middle transmission device, clutch CL104 and brake B102 are eliminated, and the system functions are delineated in Table 7.

FIG. 8 shows the seventh application of the system of FIG. 1. It discloses an application which includes additional clutch CL105 and eliminates clutches CL101, CL104 and brake B102, and the system functions are delineated in Table 8.

The above described application examples are for reference only, and it will be appreciated that other practical applications can be achieved by arranging the front and the rear section loads and distributed coupling structure according to performance requirements without departing from the invention by selecting the appropriate operating and control components.

For the case when the systems of the examples in FIG. 1-8 are applied to vehicles, the angular displacement relationships between the front and rear section loads and the drive power source resulting from the transmission ratio and the wheel outside diameter differences may be as follows: The angular displacement speed of the two loads and the



drive side rotational power source are operated according to the wheel system ratio relationships, or the angular displacement relationship between the two loads and their operations with the drive side rotational power source are not according to the wheel system ratio (such as slipping on the road surface). In particular, the relationships between the angular displacement of the rear section load and the drive side power source or between the front and rear section loads can be especially set not to operate according to the wheel system ratio relationship, but to operate through the differential acting adjustment by the electromagnetic coupling device:

The differentially acting adjustment of the electromagnetic coupling device M101 includes an active adjustment based on the input power when functioning as a motor or a passive adjustment to output power when functioning as a generator:

In vehicle driving applications of the aforesaid front section load and the rear section load, the front section load can be the front wheel or the rear wheel, and the rear section load can be the matched front wheel or rear wheel structure with the aforesaid definition;

The distributed differential coupling combined power system has possible numerous operating functions and in the practical applications can be constructed to be provide all or part of those functions.

As summarized from the above descriptions, the distributed differential coupling combined power system of the invention can be applied to vehicles, boats, or other machinery requiring combined driving power. The examples given herein encompass the various applications of the basic distributed differential coupling combined power system concept of the invention and in practical applications, any peripheral components for the output functions can be selected according to need, providing a highly flexible system.

							СОМР	COMPONENTS				
FUNCTIONS		B101	B102	P101	CL101	CI.102	CL103	CL.104	G/M (M101)	BT101	REMARK	ı
FI-A	The engine fuel valve is controlled to drive the engine from low speed to high speed	#HO	:HO.	0-MAX	NO SI-IO	N <sub>C</sub>	itio.	NO.	*READY **READY	*READY **READY ***READY	*Drive the rear section load  *Drive the front and rear section loads simultaneously	
₩.i:	The engine fuel vale and the M101 is controlled simultaneously to thive the engine from low speed to this speed to help speed and to change the better circultaneously.	:HO	NO	D-MAX	::HO•	N O	**************************************	NO.	GIEN.	CHARGE	***Drive the front section load	11
El-C	contrey simultaneous, or the engine is speed controlled or operated at a constant speed, wherein the battery charging current from the M101 is controlled to change the	:1:10	÷.	*0.MAX OR CONSTANT SPEED **0.MAX	:E:0	Z O	.00. •00.	NO C	N	DIS. CHARGE	*Drive the rear section load **Drive the front and rear section loads simultaneously	
FI-D	output power to the total.  The engine is speed controlled or operated at a constant speed, wherein the M101 generates short cut current to control the output shaft ineque, thereby to change the rotain stood	:HO	:1:10	•0.MAX OR CONSTANT SPEED ••0.MAX	:1:10	NO		NO	OEN.	READY	*Drive the rear section load  **Drive the front and rear section loads simultaneously	
7.1	The M101 is powered by the battery to change the speed or the rotation direction of the rear section had	N <sub>O</sub>	#B -	STOP	:±10	:H0	i:iO	N <sub>O</sub>	MOTOR	DIS CHARGE		
Ē	The MIOI is powered by the battery to change the speed or the rotation direction of the front section load	:1:10	N O	STOP	). I	Olf	NO	:H0	MOTOR	DIS. CHARGE		
<del>1</del> .	The engine is operated at a preset speed while the MIOI is operated as a motor to provide added power output to drive the rear section load.	:1:10	110	O MAX OR CONSTANT SPEED	:H0	NO .	OFF	NO	MOTOR	DIS: CHARGE		
# <del>.</del>	The engine is operated at a preset speed while the MIOI is operated as a motor to provide added power oputput to drive the front and rear evening loads.	:HO	.H:10	0-MAX	OH7:	NO	NO O	NO	MOTOR	DIS- CHARGE		12
Σ.	The M101 is operated as a generator to charge the battery using the recovered rear section kinetic energy	.1:10• • 0.0	:HO	*SLOW OR STOP **STOP-MAX	:1:0		0I-F:	NO	GEN.	CHARGE	*The engine piston friction damping is activated simultaneously **Recovery of the kinetic energy	
9	The M101 is operated as a generator to charge the battery using the removed front section kinetic energy	.THO	NO	*STOP-MAX	:tio	*00 *00*	NO	014:	GEN.	CHARGE	• The engine piston fraction damping is activated simultaneously • *Recovery of the kinetic	

TABLE 1-continued

							COMI	COMPONENTS				
FUNCTIONS		B101	B101 B102	P10I	CL101	CI.102	CL101 (1.102 CL103 (1.104 (M101)	CI.104	G/M (M101)	B1101	REMARK	
	All the loads are braked by the engine friction damping	HO	4.IO	SLOW OR STOP	:HO	NO	NO	NO	READY	READY		
	The system is self charged	:1:10	N.C	0-MAX OR	: <u>:</u> :0	NO.	:HO	:1:10	CHN.	CHARGE		
	(It can be stopped at a preset time or controlled by the capacity) through that the M101 is drived by the engine to be operated as a generator to charge the battery or to provide varied or constant			CONSTANT SPEED								13
	frequency AC generation output The M101 is operated as a motor	:1:10	N S	STOP TO START	:1:10	NO.	.110	3HO	MOTOR	DIS.		
	to start the engine Neutral Slide	<del>1</del> 10	OFF OFF	STOP OF 0-MAX	::10	OFF:	::10	3.HO	READY	CHARGE		

1) CHARGI; current of FLB is load following distributed
2) The M101 is an electromagnetic coupling device
3) HT101 is the battery
4) GFIN: is a betatery
4) GFIN: is the battery
5) Fro the case of engine, the P101 is the drive side rotational power source which is employed to drive the front section load and is series combined with the M101 to drive the rear section load
5) Fror the case of engine, the P101 is the drive side rotational power source which is employed to drive the front section load and is series combined with the M101 to drive the rear section load
5) First the case of engine, the P101 is the drive source which is employee the electrical machine with AC power generating functions comprised of a permanent magnet or winding excited, varied frequency driven field type electrical device, or a brushed alternator type electrical device, wherein its armature winding is commonly installed the conducting rings for AC output and the communicators for DC. Input/output.

					TABLE 2	2	COMP	COMPONENTS				
FUNCTIONS		B.01	B102	P101	CL101	CI.102	CI.103	CI.104	G/M (M101)	BT101	REMARK	
FI.A	The engine fuel valve is controlled to drive the engine from	:HIO	:HO.	0.MAX	NO.	NO	:+iO•	NO.	*READY	*READY	*Drive the rear section load	,
<b>8</b> -13	low speed to high speed The engine fuel vale and the M101 is controlled simultaneously to drive the engine from low speed to high speed and to charge the	OFF.	HO.	0-MAX	.HO.	N C	NO NO NO	NO TO	GEN.	CHARGE	section loads simultaneously  ***Drive the front section load	15
FI.C	battery simultaneously. The engine is speed controlled or operated at a constant speed, wherein the battery chaging current from the M101 is controlled to change the	<u> </u>	3H:	*0-MAX OR CONSTANT SPEED **0-MAX	:I: 0	Z	.00.	z S	CIEN	DIS CHARGE	*Drive the rear section load **Drive the front and rear section loads simultaneously	
	output power to the toad. The engine is speed controlled or operated at a constant speed, wherein the M101 generates short cut current to control the output shaft torque, thereby	<u>:</u>	<b>340</b>	•0-MAX OR CONSTANT SPEED ••0-MAX	:H:	N O	.00. ••0N	NO.	GEN.	READY	•Drive the rear section load ••Drive the front and rear section loads simultaneously	
2:1	to change the engine speed  The M101 is powered by the battery to change the speed or the rotation direction of the	S	:4:00 1	STOP	:±10	OF1:	9FF	NO	MOTOR	DIS. CHARGE		
V:1:	rear section load The engine is operated at a preset speed while the M101 is operated as a motor to provide added power output to drive the	ë	:1:10	O-MAX OR CONSTANT SPEED	OH:	N O	:1:10	N O	MOTOR	DIS- CHARGE		
9.7 <u>.</u> 7.	rear section load  The engine is operated at a preset speed while the M101 is operated as a motor to provide added power opuput to drive the	: <del>1</del> 10	:1:10	0-мах	OI-I:	NO	N O	N O	MOTOR	DIS- CHARGE		1
æ	front and real section todas.  The M101 is operated as a generator to charge the battery using the recovered rear.	• OF:	3H0	*SLOW OR STOP	OFF	:E10•• NO•	:H:10	NO	CHIN-	CHARGE	*The engine piston friction damping is activated simultaneously	16
<u>r</u> 2	section kinetic energy All the loads are braked by the engine friction damping	: <u>+</u> 10	it d	SLOW OR STOP	:HO	N 8	NO S	NO S	READY	READY	** Kecovery of the kinetic energy	
<u>e</u>	Into System is sent changed (It can be stopped at a preset time or controlled by the capacity) through that the M101 is drived by the engine to be operated as a generator to charge the battery	5	Š	CONSTANT SPEED	5	5	5	5				

TABLE 2:continued

					.*		COM	COMPONENTS			
FUNCTIONS		B101	B102	P101	CL.101	CI.102	CI.103	CL.102 CL.103 CL.104 (M101)	G/M (M101)	B/T101	REMARK
6:1	or to provide varied or constant frequency AC generation output The M101 is operated as a motor	:HO	NC	STOP TO START	:1:10	NO.	±10	:HO	MOTOR	DIS	
F10	to start the engine Neutral Slide	OFF OFF	OFF.	STOP OT 0-MAX	OFF	:HO	:FIO	OFF	READY	CHARGE READY	1
1											

Notes:

1) CIIARGIE current of FI-B is load following distributed
2) The MI01 is an electromagnetic coupling device
3) BFIVI is the hattery
4) GFIVI is a generator
5) If the case of engine, the P101 is the drive side rotational power source which is employed to drive the front section load and is series combined with the M101 to drive the rear section load
5) For the case of engine, the P101 is the drive side rotational power source which is employee the electrical machine with AC power generating functions comprised of a permanent magnet or winding excited, varied frequency driven field of bif the case of AC power output function in F8, the said M101 is armature winding is commonly installed the conducting rings for AC output and the communicators for DC input/output.

TABLE 3

						СОМІ	COMPONENTS			li
FUNCTIONS		BIOI	P101	CL.101	C1.102	C1.103	(M101)	BT101	REMARK	
F1-A	The engine fuel valve is controlled to drive the engine from how enoughts back to high enough	OHF	0.MAX	NO.	NO	NO.	*READY **READY	*READY **READY	*Drive the rear section load *Drive the front and rear	İ
F1-8	The engine fuel vale and the M101 is controlled simultaneously to drive the engine from low speed to high speed and to change the butters a simultaneously.	<del>1</del> 0	0.MAX	:HIO•	N C	NO.	GEN.	CHARGE	•••Drive the front section load	19
FI C	The engine is speed controlled or operated at a constant speed, wherein the battery charging current from the M101 is controlled to change the option to the load:	<del>1</del> 0	*0 MAX OR CONSTANT SPEED **0-MAX	÷.	Z C	990. NO.	NHO	DIS	•Drive the rear section load ••Drive the front and rear section loads simultaneously	
J-I-D	The engine is speed controlled or operated at a constant speed, wherein the M101 generates short cut current to control the output shaft torque, thereby to chause the engine sneed	1 <del>-</del> 10	*0-MAX OR CONSTANT SPEED **0-MAX	:100	NO	• OFF	·N.15	READY	*Drive the rear section load  *Drive the front and rear section loads simultaneously	
1.2	The M101 is powered by the battery to change the speed or the rotation direction of the rear section had	<u> </u>	STOP	:1:0	9HF	:EIO	MOTOR	DIS: CHARGE		
14.A	The engine is operated at a preset speed while the M101 is operated as a motion to provide added power output to drive the rear section had	H0	0-MAX OR CONSTANT SPEED	::10	NO	:H0	MOTOR	DIS. CHARGE		
₩.₩	The engine is operated at a preset speed while the M101 is operated as a motor to provide added power opuput to drive the from and reas section loads.	:HO	0.MAX	:HO	NO	NO	MOTOR	DIS. CHARGE		
FS	The M101 is operated as a generator to charge the battery using the recovered rear section kinetic energy	.400 .410	•SI.OW OR STOP ••STOP-MAX	:t-10	*00 *EIO**	J-IO	GEN.	CHARGE	*The engine piston friction damping is activated simultaneously **Recovery of the kinetic energy	20
r.	All the loads are braked by the engine friction damping	:1:10	SLOW OR	:1:10	NO	NO.	READY	READY	(4)	
8:1	The system is self charged (It can be stupped at a preset	:1:10	O-MAX OR CONSTANT SPIED	:H0	N <sub>O</sub>	:1:10	GEN	CHARGE when the engine is stonmed	The operation is limited is	
	time or controlled by the capacity) through that the M101 is drived by the engine to be operated as a generator to charge the ballery	is locked							and the rear load brake	

TABLE 3-continued	SETTEMOOFFOO

						CO	COMPONENTS		
FUNCTIONS		B101	P101	CI.101	CI.101 CI.102	CL.103 (M101)	(M101)	BT101	REMARK
<u>51</u>	or to provide varied or constant frequency AC generation output The M101 is operated as a motor	÷.	STOP TO START	:±0	ž	: <u>:</u> :	MOJOR	SIC	
	to start the engine								CHARGE
F10	Neutral Slide	:H:O	STOP TO 0-MAX	:1:10	Ol4: OH:	:EGC	READY	READY	

Notes:

1) CHARGE current of F1-B is load following distributed.

2) The M101 is an electromagnetic coupling device.

3) BT101 is the battery.

3) BT101 is a generalor.

3) BT101 is a generalor.

5) For the case of engine, the P101 is the drive side rotational power source which is employed to drive the front section load and is series combined with the M101 to drive the rear section load.

5) For the case of engine, the P101 is the drive side rotational power source which is employee the electrical machine with AC power generating functions comprised or winding excited, varied frequency driven field by For the case of AC power output function in F8, the said M101 is schecified to employee the electrical device, or a brushed alternator type electrical device, wherein its armature winding is commonly installed the conducting rings for AC output and the communicators for DC input/output.

TABLE 4

						СОМ	COMPONENTS			1
FUNCTIONS		B101	P101	CL.101	Cl.102	CI.103	(M101)	BT101	REMARK	ı
FI.A	The engine fuel valve is controlled to drive the engine from how send to high smed	:1:10	0-MAX	NO.	NC C	:FIO.	•READY ••READY	•READY ••READY	*Drive the rear section load  **Drive the front and rear section loads simulaneously	
8-12	The engine fact vale and the M101 is controlled simultaneously to drive the engine from low speed to high speed and to charge the high speed and to charge the high speed and the speed	#10	0.MAX	•0H	NO	.01:1: NO	GEN.	CHARGE	•••Drive the front section load	23
FI.C	The engine is speed controlled or operated at a constant speed, wherein the battery charging current from the M101 is controlled to change the controlled to change the controlled to change the controlled to the load:	::100	*0.MAX OR CONSTANT SPEED **0.MAX	:410	N.C	NO.	GEN.	DIS- CHARGIE	•Drive the rear section load ••Drive the front and rear section loads simultaneously	
FI-D	The engine is speed controlled or operated at a constant speed, wherein the M101 generates short cut current to control the output shaft torque, thereby to chance the engine speed	:100	**0.MAX OR CONSTANT SPEED **0.MAX	:H:	N <sub>O</sub>	NO.	Clen.	READY	*Drive the rear section load  *Drive the front and rear section loads simultaneously	
F2	The MIOI is powered by the hattery to change the speed or the rotation direction of the reason had	NO -	STOP	:t-10	:H	:H:	MOTOR	DIS. CHARGI:		
F4.A	The engine is operated at a preset speed while the M101 is operated as a motor to provide added power output to drive the reas section had	:E00	O-MAX OR CONSTANT SPEED	OFF:	NO.	OI:1:	MOTOR	DIS. CHARGE		
F4:B	The engine is operated at a preset speed while the M101 is operated as a motor to provide added power oputput to drive the front and reas evertion londs.	:100	0 MAX	÷IO	<u>N</u>	NO	MOTOR	DIS. CHARGE		
₹2	riving and real section reads generated as a generated to change the battery using the recovered rear section kinetic energy		•STOP-MAX	OH:	HO.	.HO	GIEN.	CHARGE	<ul> <li>The cugine piston friction damping is activated simultaneously</li> <li>Recovery of the kinetic energy</li> </ul>	24
9	The M101 is operated as a generator to charge the battery using the recovered front section kinetic energy	:1:0	*STOP-MAX	NO.	NO	GEN.	CHARGE	*The engine piston friction damping is acti- vated simultaneously **Recovery of the kinetic		
ы	All the loads are braked by	:+:0	SI.OW OR	OFF:	NO	NO	READY	energy READY		

TABLE 4-continued

FUNCTIONS

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READY

READY

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STOP TO 0-MAX

<u>::</u>:

to start the engine Neutral Slide

0:

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	B101	P101	CL101	CL101 CL102 CL103 (M101)	CL.103	COMPONENTS  (M101)	BT101	REMARK
the engine friction damping The system is self charged (It can be stopped at a preset	:HO	STOP 0 MAX OR CONSTANT SPEED	.H0	NO	:H0	GEN	CHARGE when the engine is	CHARGE: The operation is limited when the engine is
through that the M101 is drived by the capacity) through that the M101 is drived by the cagine to be operated as a generator to charge the battery or to provide varied or constant	" is locked.						Robled	and the rear load brake
nequency Ac. generation output  The M101 is operated as a motor	:1:10	STOP TO START	01·F	N C	:1:10	MOTOR	DIS	

Notes:

1) CHARCII: current of 17.18 is load following distributed
2) The M101 is an electromagnetic coupling device
3) BT101 is the battery
4) BT101 is the battery
4) GEN: is a generator
5) For the case generator
5) For the case of AC power output function in 18, the said M101 is selected to employee the electrical machine with AC power generating functions comprised of a permanent magnet or winding excited, varied frequency driven field by the case of AC power output function in 18, the said M101 is selected to employee the electrical machine with AC power generating functions comprised of a permanent magnet or winding excited, varied frequency driven field by the electrical device, or a brushed alternator type electrical device, wherein its armature winding is commonly installed the conducting rings for AC output and the communicators for DC input/output.

			<b>27</b>	p A	p &				28	cncrey	5
	RI:MARK	*Drive the rear section load **Drive the front and rear section loads simultaneously	•••Drive the front section load	*Drive the rear section load **Drive the front and rear section loads simultaneously	*Drive the rear section load **Drive the front and rear section loads simultaneously					*The engine piston friction damping is activated simultaneously **Recovery of the kinetic energy	*The engine pisson friction damping is activated simultaneously  **Recovery of the kinetic energy
	RT101	*READY **READY ***READY	CHARGE	DIS. CHARGE	READY	DIS. CHARGE	DIS: CHARGE	DIS- CHARGE	DIS. CHARGE	CHARGE	CHARGE
	G/M (M101)	•READY ••READY	CIEN.	CIEN	CIEN:	MOTOR	MOTOR	MOTOR	MOTOR	GI:N.	GEN.
COMPONENTS	C1.104	NO.	NO:	Z .	<u>Z</u>	NO O	:HO	Z C	N C	NO	OI4:
COM	CI.103	HO NO	NO.	**************************************	10. NO.	:1:10	NO	9IE	N O	OFF:	NO
	CI.102	N O	Z S	N C	Z C	OFF	:1:10	N C	NC C	.0N	NO•
	CI.101	NO.		: <del>!</del> :0	.:- 	OI-I:	:H:10	OH:	:1:10	HIO	#10
	P101	0-MAX	0-MAX	*0-MAX OR CONSTANT SPEED **0-MAX	*O.MAX OR CONSTANT SPEED **O.MAX	STOP	STOP	O-MAX OR CONSTANT SPEED	0.MAX	•SLOW OR STOP ••STOP-MAX	*STOP MAX
	13102	#10 #10	910. 9016. NO.	: <del>!</del>	<del>11</del>	. OFF	N O	#5	3H:	:1:10	N <sub>O</sub>
	1018	:tio	<del>1</del> 10	:H-00	:H:0	NO O	:1:10	3-10 3-10			OH:
		The engine fuel valve is controlled to drive the engine from low enced in high speed	The craim fact value and the M101 is controlled simultaneously to drive the engine from low speed to high speed and to charge the	nattery simultaneously. The engine is speed controlled or operated at a constant speed, wherein the battery charging current from the M101 is controlled to change the outron rosser to the lead-	The cupine is year controlled or operated at a constant speed, wherein the M101 generates short cut current to control the output shall torque, thereby to shound the coupur shall torque, thereby to shound the coupur shall torque, thereby	The M101 is powered by the battery to change the speed or the rotation direction of the control for the rotation from both	The MIOI is powered by the battery to change the speed or the rotation direction of the front section load	The crigine is operated at a preset speed while the M101 is operated as a motor to provide addred power output to drive the contraction had	The cogine is operated at a preset speed while the M101 is operated as a motor to provide added power opupuli to drive the front and reas eccition loads.	The MIOI is operated as a general to charge the battery using the recovered rear social whether expenses	The Mills is operated as a generator to charge the battery using the removed front section kinetic energy
	FUNCTIONS	FI.A	F1.8	FI.C	FI.D	23	₾	F4-A	H-1-19	<del>2</del> 5	<u> 29</u>

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בות	֡֜֝֝֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜
ARIF	ו
ARIF	֚֡֝֜֜֜֜֜֜֜֜֜֜֜֓֓֓֓֜֜֜֓֓֓֓֜֜֜֜֓֓֓֓֜֜֜֜֜֓֓֓֓֓
TARIFS	֚֚֡֝֜֝֜֜֜֝֜֜֜֜֜֜֓֓֓֜֜֜֓֓֓֜֜֜֜֜֓֓֓֓֜֜֜֜֜֜֓֓֓֜֜֜֜֓֓֓֜֜֜֓֡֓֜֜֜֜֡֓֜֜֜֜֡֓֜֜֡֡֓֜֜֡֡֡֡֡֜֜֡֡֡֜֜֜֡֡֓֜֜֜֜֡֡֜֜֜֜֜֜
4	֡֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜
TARIF	֡֜֜֜֜֜֜֜֜֜֜֜֓֓֓֓֜֜֜֜֜֜֓֓֓֓֓֜֜֜֜֜֜֜֜֜֜֜

							COM	COMPONENTS				ı
FUNCTIONS		B101	B102	P101	CL.101	CL.102	CL.103	CL104	G/M (M101)	BT101	REMARK	
1.1	All the loads are braked by	OFF	:±10	SLOW OR	:HO	NO	NO O	NO	READY	READY		ı
<u>æ</u>	ine engine inction damping. The system is self charged (It can be stopped at a preset time or controlled by the capacity) through that the M101 is drived by	OFF	ON NO	0-MAX OR CONSTANT SPEED	:1:10	N O	OH:	:140	GEN.	CHARGE	The operation is limited to when the engine is stopped	29
	the engine to be operated as a generator to charge the battery or to provide varied or constant											
6:1	frequency AC generation output The M101 is operated as a motor	±16	S S	STOP TO START	:1:10	S	:±:0	:HO	MOTOR	DIS.		
E10	Neutral Slide	<u>:</u>	#10	STOP OT 0-MAX	:10	:: 10 3	# 3	it a	READY	READY	ar.	
<b>Ξ</b>	The Engine is used to drive the front section load, and the M101 is used to drive the rear section load, and both	Š	<del>-</del>	O	<del>.</del>	Š	5	Š	<del>.</del> 5	MOLOK	DIS: CIIARGIE	
F12	The engine is used to drive the front section had and the M101 is pulled to be operated as a generator to charge the battery	NO O	Ho	0.MAX	:±:10	NO .	N <sub>O</sub>	HO	GEN	CHARGE		

1) CHARCH: current of F1-B is load following distributed
2) The M101 is an electromagnetic coupling device
3) BT101 is the hattery
4) GEN: is a battery
5) First the case of engine, the P101 is the drive side rotational power source which is employed to drive the front section load and is series combined with the M101 to drive the rear section load
5) For the case of engine, the P101 is the drive side rotational power source which is employed to drive the electrical machine with AC power generating functions comprised of a permanent magnet or winding excited, varied frequency driven field by the case of AC power output function in F8, the said M101 is armature winding is commonly installed the conducting rings for AC output and the communicators for DC input/output.

TABLE 6

							COMP	COMPONENTS				
FUNCTIONS		B101	В102	P101	CI.101	C1.102	CL.103	CI.104	G/M (M101)	BT101	REMARK	
F1-A	The engine fuel valve is controlled to drive the engine from low eneed to high speed	:1:10	**************************************	0-MAX	NO.	N O	:HO.	NO.	*READY  *READY  **READY	*READY **READY ***READY	*Drive the rear section load  **Drive the front and rear section loads simultaneously	
E: 1:3	The engine fact viet and the M101 is controlled simultaneously to drive the engine from low speed to high speed and to charge the	H	HO	0-MAX	::10•	NO O	NO.	NO.	CIEN.	CHARGE	•••Drive the front section load	31
F)-C	Datery simultaneously.  The engine is speed controlled or operated at a constant speed, wherein the battery charging current from the M101 is controlled to change the	: <del> </del>	:H:	*0.MAX OR CONSTANT SPEED **0.MAX	:H:0	N <sub>O</sub>	:E10•	NO O	GEN.	DIS. CHARGE	*Drive the rear section load  *Drive the front and rear section loads simultaneously	
ij.D	The crigine is speed controlled or operated at a constant speed, wherein the M101 generates short cut current to control the output shall torque, thereby to show the properties of the couputs that the couput shall torque, thereby to show the professions crowd.	:Ho	::10	*0-MAX OR CONSTANT SPEED **0-MAX	:1:	N <sub>C</sub>	• OIH.	NO	GEN-	READY	*Drive the rear section load  **Drive the front and rear section loads simultaneously	
1.3	to change in engine speed. The M101 is powered by the battery to change the speed or the rotation direction of the control bank and the control bank.	Š	÷ 5	STOP	:1:10	: <del>1</del>	:H:	N	MOTOR	DIS. CHARGE		
14.A	The engine is operated at a preset speed while the MIOI is operated as a motor to provide added power output to drive the consists load.	:1:10	:H0	O-MAX OR CONSTANT SPEED	:H:O	NO	:H:10	N O	MOTOR	DIS- CHARGE		
F4-B	The engine is operated at a preset speed while the MIOI is operated as a motor to provide added power opupulu to drive the food.	:±10	9.E	0.MAX	:1:10	NO .	N <sub>C</sub>	N. C	MOTOR	DIS. CHARGE		3
<u>ε</u>	Thou and the section roads The MIOI is operated as a generator to charge the battery using the recovered rear section kinetic energy	1:10• • ON	: <del>!</del> :	•SIOP-MAX	:1:10	•00+	3 <del>1</del> 0	N ·	GIEN-	CHARGE	<ul> <li>The engine piston friction damping is activated simultaneously</li> <li>Recovery of the kinetic energy</li> </ul>	2
ы	All the loads are braked by the engine friction damping	<del>1</del> 10	STOP	SLOW OR	:1:10	N O	N O	N O	READY	READY		
<u>*</u>	The system is self charged (It can be stopped at a present time or controlled by the capacity) through that the M101 is drived by the engine to be operated as a generator to charge the battery	<del>1</del> 0	No.	0-MAX OR CONSTANT SPEED	· •	N.C	<del>2</del>	<u>:</u>	X.	CHARGE	The operation is limited to when the engine is stupped	

TABLE 6-continued

## 124 OF THE TOTAL PROPERTY OF THE TOTAL PR	101 REMARK		ARGE:		CITARGIE READY MOTOR DIS. CHARGIE	DIS. CHARGE:
	G/M (M101) BT101	MOTOR DIS-				
COMPONENTS	CL.104	OHT: MC			OFF RE	
8	Cl.102 Cl.103	:HO				
	CL101 CL.I	NO HO			0FF 00FF	
	P101	STOP TO STARF				
	B101 B102	NO		±10	## ## 600	#10 #10
	B101	±i0		:10	C O	ON ON
		or to provide varied or constant frequency AC generation output The M101 is operated as a motor	origin of the or	to start the engine Neutral Stide	to start the engine Neutral Slide The engine is used to drive the front section load, and the M101 is used to drive the rear section load, and both are independently operated	to start the engine Neutral Slide The engine is used to drive the from section load, and the M101 is used to drive the rear section load, and both are independently operated The engine is used to drive the from section load and the M101 is pulled to be operated as a generator to charge the
	FUNCTIONS	6:1		F10	013 EII	F10 F12 F12

1) TICKERS current of F1-B is load following distributed
2) The M101 is an electromagnetic coupling device
3) BF101 is the battery
4) GEN. is a generator
5) For the case of engine, the P101 is the drive side rotational power source which is employed to drive the front section load and is series combined with the M101 to drive the rear section load
5) For the case of engine, the P101 is the drive side rotational power source which is employee the electrical machine with AC power generating functions comprised of a permanent magnet or winding excited, varied frequency driven field by For the case of AC power output function in F8, the said M101 is armature winding is commonly installed the conducting rings for AC output and the communicators for DC input/output.

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Fig. 10   Fig.					}							ŀ
The captie fied ut the is controlled of   The captie fied ut the target of   The captie fied ut the isolate   The captie fied ut the larget of   The captie fied ut the captie fi							٥	OMPONEN	S			ı
The cripic fiel table is contacted   OH	SNOLLSNIE		2	3	5	3	5	Ş	G/M	101.10	ad s Mild	
The crapie of the controlled   OH	CHACTERIAS		010	101	CINIO	C1.102	CHTIO	COLLIN	(101101)	10110	NEWARK	
The capter lot of an other Month   OFF MAX	F1-A	The engine fuel valve is controlled to drive the engine from	:HIO	0-MAX	NO.	NO	:+10• NO••	NO.	*READY	*READY	*Drive the rear section load	I
The capter for what the MMI		low speed to high speed			::10•••		NO::	:1:10	***READY	***READY	section loads simultaneously	
1	FI-B	The engine fuel vale and the M101	). HO	0-MAX	•OI:F	N O	:EIO•	O	CEN	CHARGE	***Drive the front section load	3
for the feeler from the spread at contained or of the feel at contained to change feel at containing speed.  The cigrotic of change feel at containing the feel at containing the feel at containing pred.  The cigrotic of change feel at containing pred.  The cigrotic plant feel pred.  The cigrotic plan		is controlled simultaneously to					NO:	NO.				5
C Mean of the capes where the month of the capes and the capes of the month of the capes of the capes of the month of the capes of		drive the engine from low speed to high search and to observe the					Z	÷				
Pre-cagine is executed as a society dependent of the property of the pre-cagine is executed band of the cagine is executed by the control of the pre-cagine is executed to the half of the cagine is executed as a most to provide a society of the cagine is executed to the half of the cagine is executed to the half of the cagine is executed as a most to provide a society of the cagine is executed to the half of the cagine is executed to the cagine the half of the cagine to the cagine		battery simultaneously										
wherein the MILITIS action load simultaneously current from the MILITIS action of the four and rear section the MILITIS action of the MILITIS action of the MILITIS ACTORISTANT SPEED TO MAX OR TO THE TOTAL SPEED TO THE COUNTY S	F1.C	The engine is speed controlled or	110	*0-MAX	:HO	S	:1:10+	N C	N.E.	DIS.	*Drive the rear section load	
where the faute of the regime is expected in the Mill is secretared as a monto to provide the regime is expected as a received by the regime is expected as a received by the regime is expected by the regime is the regime is expected by the regime is the regime in the regime is the regi		operated at a constant speed,		OR			NO.			CHARGE	**Drive the front and rear	
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ough after control feet of the MID is generated short of change the region feet of the man of the manual specific short of the manual specific spe	ri-D	ine engine is speed controlled or	<u>.</u>	O-MAA OK	<del>:</del> 5	Z O		5	: CIII)	READT	**Drive the rear section toad	
auterial to control the polyulus shall targets, thereby to change the regime speed of the regime fortion and rear section loads of the supers of the speed at a present control that is presented as a more to provide a sate of the speed of the s		operated at a constant speed,		**ONSTAIN SPEED			5				coation loads simultaneously	
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added power output to drive the rear section had The engine is operated as a motor to provide added power output to drive the rear section had a preset speed while he MOI is operated as a motor to provide added power opuput to drive the from and rear section hads are section hads are backed by a perset as a section while the battery section kindle controlled by the capacity of the battery of the battery as simple controlled by the capacity of the capacity had the MIOI is drived by the region to charge the battery as a generation to charge the battery are storiled by the capacity of t		preset speed while the M101 is		CONSTANT SPEED						CHARGE		
added power online to drive the regime is operated at a preset speed while the MIOI is preset speed while the MIOI is operated as a motor to provide added power optuput to drive the from and rear section loads are the MIOI is operated as a motor to provide added power optuput to drive the from and rear section loads. The RIOI is operated as a motor to provide added power optuput to drive the from and rear section loads are the MIOI is of the RIOI is a friend and present and the reagent of the kinetic energy and the balacter of the RIOI is drived by the engine friction damping the rear load friend and present of the kinetic energy and the present of the capacity the engine friction damping the engine to be operated as a seperated to charge the Baltry the MIOI is drived by the engine to be operated as a separated as a motor to the engine friction damping the MIOI is drived by the engine to the property of the friction of the property of the friction		operated as a motor to provide										
The capies of special and section load The capies of special and special and special s		added power output to drive the										
preset special wild is a portated at a motor to provide added power opuput to drive the from and rear section hods a motor to provide added power opuput to drive the from and rear section hods are section wild is drived by the capacity)  OFF ON OFF OFF	0 13	rear section load	:::0	> 444 0	330	Ž	3	Š	MOUTOD	310		
operated as a montor to provide added power oputput to drive the from and rear section loads The MIOI is uperated as a montor to provide added power oputput to drive the from and rear section loads The MIOI is drived by In system is self charged (It can be stopped at a preset through that the MOI is drived by In the operation to charge the battery  **OIF  **ON  **ON  **ON  **OIF  **ON  **O		preset speed while the MIOI is	5	V. M. A.	5				No. Com	CHARGE		
added power opuput to drive the front and rear section loads The MDI is operated as a secured tear section loads The MDI is operated as a secured tear section loads The MDI is operated as a secured tear  Schow OR STOP OFF **ON OFF ON OFF OFF		operated as a motor to provide										
front and rear section loads  The MIOI is uperated as a secured to charge the battery of the MIOI is uperated as a secured to charge the battery of the MIOI is uperated as a secured to charge the battery of the MIOI is uperated as a secured to charge the battery of the MIOI is uperated as a secured to charge the battery of the MIOI is drived by the capacity)  If the MIOI is uperated as a preset of the MIOI is drived by the capacity of the cap		added power oputput to drive the										
The MIOI is operated as a *Oi-i *SLOW OR STOP OFF *ON OI-i *ON OI-		front and rear section loads										30
generator to charge the battery using the recovered rear section kinetic energy All the loads are braked by the capine friction damping The system is self charged Oi-F:	<u>5</u>	The M101 is operated as a	:: O	SLOW OR STOP	: <u>:</u>	NO.	: <u>:</u>	N O	CEN	CHARGE	*The engine piston friction	5
section fruit control teals section fruit control teals section fruit control teals are braked by Oi-j: SLOW OR OF-j: ON ON READY READY All the loads are braked by Oi-j: SLOW OR OF-j: ON-j: OF-j: OF		generator to charge the battery	5	-SIOF-MAX		÷					damping is activated	
All the days are braked by Oi ii SLOW OR Of ii ON ON READY READY READY the cngine friction damping STOP Oi ii can be stopped at a preset CONSTANT SPEED (It can be stopped at a preset CONSTANT SPEED (Inc or controlled by the capacity) (through that the MIOI is drived by the capacity) the engine to be operated by the capacity of the engine of the capacity of the engine of the eng		section binetic energy									** Document of the Vinetic energy	
the engine friction damping STOP  The system is self charged Oi-i- 0-MAX OR Oi-i- Oi-i- Oi-i- CHARGE  (It can be stopped at a preset CONSTANT SPIED  time or controlled by the capacity) through that the MIOI is drived by the engine to be operated by a generator to charge the ballery	E	All the loads are braked by	.i:O	SI.OW OR	HO.	NO	N <sub>O</sub>	NO	READY	READY	recovery of the Kinetic energy	
The system is self charged Oi-F O-MAX OR Oi-F ON Oi-F Oi-F OI-F OI-F OI-F OI-F OI-F OI-F OI-F OI		the engine friction damping		STOP								
CONSTANT SPIRED ed by	<u>8:1</u>	The system is self charged	OF.I:	0.MAX OR	OFF.	N <sub>C</sub>	0H:	:1:10	GEN.	CHARGE	The operation is limited	
		(It can be stopped at a preset		CONSTANT SPEED							to when the engine is stopped	
		through that the M101 is drived by									and the real todd orake is becked	
a concator to charge the baltery		the engine to be operated as										
		a generator to charge the battery										

TABLE 7-continued

						CC	COMPONENTS	S			
FUNCTIONS		B101	P101	CL.101	CL.101 CL.102	CL.103	G/M CL.103 CL.105 (M101)	G/M (M101)	BT101	REMARK	
	or to provide varied or constant frequency AC generation output The MIOI is operated as a motor to start the project	:HO	STOP TO START	OFF	NO	<del>41</del> 0	<del>:</del>	MOTOR	DIS:		
F10	Neutral Slide The engine is used to drive	ii o	STOP OT 0-MAX	91:E	OFF:	it s	ii S	READY	READY	. DIS.	3'
	the front section load, and the MIOI is used to drive the rear section load, and both are independently operated			;						CHARGE.	7
F12	The engine is used to drive the front section load and the M101 is pulled to be operated as a generator to charge the battery	NO	0.MAX	:F10	NO	NO C	440	GEN.	CHARGE		

1) The M101 is an electromagnetic coupling device

2) The M101 is an electromagnetic coupling device

3) BT101 is the battery

4) GEN. is a generator

5) For the case of engine, the P101 is the drive side rotational power source which is employed to drive the front section load and is series combined with the M101 to drive the rear section load

5) For the case of engine, the P101 is the drive side rotational power source which is employee the electrical machine with AC power generating functions comprised of a permanent magnet or winding excited, varied frequency driven field by the case of AC power output function in F8, the said M101 is armature winding is commonly installed the conducting rings for AC output and the communicators for DC input/output.

						COMPONENTS	NENTS			
FUNCTIONS		B101	PIOI	CL102	CLA03	C1.105	G/M (M101)	BT101	REMARK	
FI-A	The engine fuel valve is controlled to drive the engine from	:1:10	0-MAX	NO O	HIO.	NO.	READY **READY	*READY **READY	*Drive the rear section load  *Drive the front and rear section loads simultaneously	
<del>=</del> :	The engine fuel vale and the M101 is controlled simultaneously to drive the engine from low speed to high speed and to charge the	3 <del>1</del> 0	0 MAX	NO	NO	NO.	- NEED	CHARGE	•••Drive the from section load	39
E ·C	battery simultaneously. The engine is speed controlled or operated at a constant speed, wherein the battery charging current from the M101 is controlled to change the	••0.MA	*0-MAX OR CONSTANT SPEED	N <sub>O</sub>	• 01-15 • 0N	N C	OBN.	DIS- CHARGE	•Drive the rear section load ••Drive the front and rear section loads simultaneously	
EI-D	output power to the toad:  The engine is speed controlled or operated at a constant speed, wherein the M101 generates short cut current to control the output shaft torque, thereby	:130	*0-MAX OR CONSTANT SPEED **0-MAX	NO	*OFF	NO C	CIEN	READY	•Drive the rear section load ••Drive the front and rear section loads simultaneously	
5.1	The M101 is powered by the hattery to change the speed or the rotation direction of the	Z ·	STOP	:HO	3HO	::10	MOTOR	DIS. CHARGE		
F4.A	The engine is operated at a press speed while the M101 is operated as a motor to provide added power output to drive the	::10	0-MAX OR CONSTANT SPIED	NO O	:110	N C	MOTOR	DIS. CHARGE		
Ξ. 8:	The engine is operated at a preset speed while the M101 is operated as a motor to provide added power opinput to drive the added power opinput to five the	<del>: 1</del>	0-MAX	NO O	N <sub>C</sub>	NO O	MOTOR CHARGIE	DIS-		4
<b>亞</b> ;	Iront and real section to austrice in the MIO1 is operated as a generator to charge the hattery using the recovered rear section kinetic energy	NO.	•STOP-MAX	•0N	<del>:</del> 5	NO 8	GEN.	CHARGE	*The engine piston friction damping is activated simultaneously **Recovery of the kinetic energy	10
<u> </u>	All the loads are braked by the engine friction damping. The system is self charged (It can be stopped at a preset time or controlled by the capacity) through that the M101 is drived by the engine to be operated as a generator to charge the ballery	. H	SLOW OK STOP 0 MAX OR CONSTANT SPIED	N N	N EE	it it it is a second of the se	NED NED	CHARGE	The operation is limited to when the engine is stopped and the rear load brake is locked	

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	REMARK			\$1 <b>1</b>		
	BT101 REP	SIC	CHARGI: READY		5	
COMPONENTS	G/M (M101)	MOIOR	READY	: <u>+</u> :		;
COME	CL105	N.	:1:10	S S		#16
-	CL103	E10	OFF	N C		NO
	CL102	NO	::10	S C		Š
	P101	STOP TO START	STOP TO 0-MAX	0 MAX		XVW 0
	1018	HIO.	3:10	Z C		Z C
		or to provide varied or constant frequency AC generation output The M101 is operated as a motor	to start the engine Neutral Slide	The engine is used to drive	the front section load, and the M101 is used to drive the rear section load, and both	are independently operated The engine is used to
	FUNCTIONS	6:1	F10	Ξ		F12

The MIOI is an electromagnetic coupling device

3) BT101 is the battery
4) GEN is a generator
5) For the case of engine, the P101 is the drive side rotational power source which is employed to drive the front section load and is series combined with the M101 to drive the rear section load
5) For the case of engine, the P101 is the drive side rotational power source which is employed to drive the electrical machine with AC power generating functions comprised of a permanent magnet or winding excited, varied frequency driven field.
6) For the case of AC power output function in P8, the said M101 is schecied to employee the electrical machine with AC power generating functions comprised of a permanent magnet or winding excited, varied frequency driven field.
6) For the case of AC power output function in P8, the said M101 is armature winding is commonly installed the conducting rings for AC output and the communicators for DC input/output.